WE CLAIM:

- 1. A disk drive comprising:
 - (a) a first disk surface and a second disk surface;
 - (b) an actuator arm;
 - (c) a first head coupled to a distal end of the actuator arm and positioned over the first disk surface;
 - (d) a second head coupled to a distal end of the actuator arm and positioned over the second disk surface;
 - (e) a primary actuator for rotating the actuator arm about a pivot in coarse movements;
 - (f) a first secondary actuator coupled to the actuator arm for actuating the first head over the first disk surface in fine movements;
 - (g) a second secondary actuator coupled to the actuator arm for actuating the second head over the second disk surface in fine movements;
 - (h) a servo controller for:
 - generating a first control signal applied to the first secondary actuator to position the first head over the first disk surface in fine movements while accessing the first disk surface; and
 - phase shifting the first control signal by a predetermined phase to generate a second control signal applied to the second secondary actuator to attenuate excitation of at least one arm vibration mode.
- 2. The disk drive as recited in claim 1, wherein the primary actuator comprises a voice coil motor.
- 3. The disk drive as recited in claim 1, wherein the first and second secondary actuators comprise a piezoelectric element.

- 4. The disk drive as recited in claim 1, further comprising:
 - (a) a first suspension comprising a base end coupled to the actuator arm and a distal end coupled to the first head; and
 - (b) a second suspension comprising a base end coupled to the actuator arm and a distal end coupled to the second head, wherein:
 - the first secondary actuator applies an actuating force to the base end of the first suspension; and
 - the second secondary actuator applies an actuating force to the base end of the second suspension.
- 5. The disk drive as recited in claim 4, wherein:
 - (a) the first secondary actuator is coupled to the actuator arm proximate the base of the first suspension; and
 - (b) the second secondary actuator is coupled to the actuator arm proximate the base of the second suspension.
- 6. The disk drive as recited in claim 4, wherein:
 - (a) the first secondary actuator is coupled to a first side of the actuator arm:
 - (b) a first linkage extends along the first side of the actuator arm and couples the first secondary actuator to the first suspension;
 - (c) the second secondary actuator is coupled to a second side of the actuator arm;
 - (d) a second linkage extends along the second side of the actuator arm and couples the second secondary actuator to the second suspension.
- 7. The disk drive as recited in claim 1, further comprising:
 - (a) a first mounting bracket for mounting the first head and a second mounting bracket for mounting the second head;

- (b) a first suspension comprising a base end coupled to the actuator arm and a distal end coupled to the first mounting bracket; and
- (c) a second suspension comprising a base end coupled to the actuator arm and a distal end coupled to the second mounting bracket, wherein:
 - the first secondary actuator applies an actuating force to the first mounting bracket; and
 - the second secondary actuator applies an actuating force to the second mounting bracket.
- 8. The disk drive as recited in claim 1, wherein the predetermined phase is approximately 180 degrees to attenuate excitation of an arm torsion mode.
- 9. The disk drive as recited in claim 1, wherein the predetermined phase is approximately zero degrees to attenuate excitation of an arm sway mode.

- 10. A method of attenuating excitation of at least one arm vibration mode in a disk drive, the disk drive comprising a first disk surface and a second disk surface, an actuator arm, a first head coupled to a distal end of the actuator arm and positioned over the first disk surface, a second head coupled to a distal end of the actuator arm and positioned over the second disk surface, a primary actuator for rotating the actuator arm about a pivot in coarse movements, a first secondary actuator coupled to the actuator arm for actuating the first head over the first disk surface in fine movements, and a second secondary actuator coupled to the actuator arm for actuating the second head over the second disk surface in fine movements, the method comprising the steps of:
 - (a) generating a first control signal applied to the first secondary actuator to position the first head over the first disk surface in fine movements while accessing the first disk surface; and
 - (b) phase shifting the first control signal by a predetermined phase to generate a second control signal applied to the second secondary actuator to attenuate excitation of at least one arm vibration mode.
- 11. The method as recited in claim 10, wherein the primary actuator comprises a voice coil motor.
- 12. The method as recited in claim 10, wherein the first and second secondary actuators comprise a piezoelectric element.
- 13. The method as recited in claim 10, wherein the disk drive further comprises a first suspension comprising a base end coupled to the actuator arm and a distal end coupled to the first head and a second suspension comprising a base end coupled to the actuator arm and a distal end coupled to the second head, the method further comprising the steps of:
 - (a) the first secondary actuator applying an actuating force to the base end of the first

suspension; and

- (b) the second secondary actuator applying an actuating force to the base end of the second suspension.
- 14. The method as recited in claim 13, wherein:
 - (a) the first secondary actuator is coupled to the actuator arm proximate the base of the first suspension; and
 - (b) the second secondary actuator is coupled to the actuator arm proximate the base of the second suspension.
- 15. The method as recited in claim 13, wherein:
 - (a) the first secondary actuator is coupled to a first side of the actuator arm;
 - (b) a first linkage extends along the first side of the actuator arm and couples the first secondary actuator to the first suspension;
 - (c) the second secondary actuator is coupled to a second side of the actuator arm;
 - (d) a second linkage extends along the second side of the actuator arm and couples the second secondary actuator to the second suspension.
- 16. The method as recited in claim 10, wherein the disk drive further comprises a first mounting bracket for mounting the first head and a second mounting bracket for mounting the second head, a first suspension comprising a base end coupled to the actuator arm and a distal end coupled to the first mounting bracket; and a second suspension comprising a base end coupled to the actuator arm and a distal end coupled to the second mounting bracket, the method further comprising the steps of:
 - (a) the first secondary actuator applying an actuating force to the first mounting bracket; and
 - (b) the second secondary actuator applying an actuating force to the second mounting

bracket.

- 17. The method as recited in claim 10, wherein the predetermined phase is approximately 180 degrees to attenuate excitation of an arm torsion mode.
- 18. The method as recited in claim 10, wherein the predetermined phase is approximately zero degrees to attenuate excitation of an arm sway mode.